

Claims

1. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) [sic] being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) having a non-circular shape, regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16).

2. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (12) being connected to one another in terms of flow, and the cross-section or cross-sections (48, 52, 56, 60), of this [sic] covering wall (50, 54, 58, 62) of at least one collector pipe (14, 16) of the first heat exchanger (10) and/or the second heat exchanger (12) being essentially oval or (annularly) elliptical in shape, regarded perpendicular to the longitudinal axis (32, 34, 36, 38) of the relevant collector pipe (14, 16, 18, 20).

3. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (12) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52, 56, 60) of the covering wall (50, 54, 58, 62) of at least one collector pipe (14, 16, 18, 20) of the first heat exchanger (10) and/or second heat exchanger (12), regarded perpendicular to the longitudinal axis (32, 34, 36, 38), of the relevant collector pipe (14, 16, 18, 20), being shaped such that overlapping wall segments (128, 122, or 130, 134, or 72, 74, or 76, 78, or 218, 220, or 222, 224, or 240, 242, or 250, 252, or 260, 262) are present.

4. Heat exchanger unit for motor vehicles, having at least one heat exchanger (10), this heat exchanger (10), which is in particular a radiator, having two collector pipes (14, 16) situated at a distance from one another, and these two collector pipes (14, 16) of this heat exchanger (10) being connected to one another in terms of flow, and in addition the covering wall (48, 52) of one or both of these collector pipes (14, 16) having a non-circular shape in the cross-section or cross-sections (48, 52) regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe, and the wall (24, 26), facing the other collector pipe (16, 14) of this heat exchanger (10), of the covering wall (50, 54) of this collector pipe (14, 16) being a base wall (24, 26), and the base wall (24, 26) of one or both of these collector pipes (14, 16) having a segment that is curved in the named cross-section or cross-sections, or is essentially completely curved.

5. Heat exchanger unit according to a plurality of the preceding claims.

6. Heat exchanger unit according to one of the preceding claims, characterized in that the first heat exchanger (10) is a radiator or has at least one radiator, and/or the second heat exchanger (12) is an air-conditioning condenser or has at least one air-conditioning condenser.

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7. Heat exchanger unit according to one of the preceding claims, characterized in that at least one collector pipe (14, 16) of the first heat exchanger (10) is limited by a wall (the base wall (24, 26)) that is situated on the side facing the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the outer wall (98)) that is situated on the side facing away from the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the front wall (96)) that faces the adjacent collector pipe (18, 20) of the second heat exchanger (12), as well as by a wall (the rear wall (46)) that faces away from the adjacent collector pipe (18, 20) of the second heat exchanger (12), it being provided in particular that the direction of longitudinal extension of these walls (24, 46, 96, 98) corresponds essentially to the direction of longitudinal extension of this collector pipe (14, 16) of the first heat exchanger (10).

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8. Heat exchanger unit according to one of the preceding claims, characterized in that at least one wall segment (150, 170, 172, 180, 190) or a wall (46, 96, 98) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is concavely curved, regarded in one or in all cross-sections (48, 52) that is/are perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

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9. Heat exchanger unit according to one of the preceding claims, characterized in that at least one wall (24, 46, 96, 98) or a wall segment (152, 154, 172, 182, 187, 192) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is convexly curved, regarded in the cross-section or cross-sections (48, 52) perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

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10. Heat exchanger unit according to Claim 9, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) and/or this convexly curved wall (24, 46, 96,

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98) is curved in such a way that various radii of curvature (R) are provided in this wall segment (152, 154, 172, 182, 187, 192) or in this wall (24, 46, 96, 98).

11. Heat exchanger unit according to Claim 9 or Claim 10, characterized in that this
 5 convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98) or of this convexly curved wall segment (152, 154, 172, 182, 187, 192) is less than $(0.5 \cdot x \cdot \pi)$ times the radius of curvature (R) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater
 10 than zero and less than 0.8.

12. Heat exchanger unit according to one of Claims 9 to 11, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that along the (segment) length (s_{total}) of this
 15 convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154, 172, 182, 187, 192), various radii of curvature (R) are present, the segment length (s_{total}) being less than $(0.5 \cdot x \cdot \pi)$ times the minimum radius of curvature ($R_{minimum}$) of these radii of curvature (R), and x being greater than zero and less than 0.8.

20 13. Heat exchanger unit according to one of Claims 9 to 12, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192), or this convexly curved wall (24, 46, 96, 98), is curved in such a way that along the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154, 172, 182, 187, 192), various radii of curvature are present, the (segment) length (s_{total})
 25 being less than $(0.5 \cdot x \cdot \pi)$ times the mean radius of curvature (R_{mean}) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater than zero and less than 0.8, and the mean radius of curvature (R_{mean}) corresponding to the quotient of an integral and the (segment) length (s_{total}), this integral being the integral of $(s \cdot R(s))ds$ within the limits $s=0$ and $s=s_{total}$, s being the path running along the curved wall segment
 30 (152, 154, 172, 182, 187, 192), or along the convexly curved wall (24, 46, 96, 98), and $R(s)$ being the radius of curvature at a particular position along this path.

14. Heat exchanger unit according to one of Claims 9 to 13, characterized in that the front wall (96) and/or the base wall (98) has such a curved wall segment, or is such a curved wall segment.

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15. Heat exchanger unit according to Claim 14, characterized in that the rear wall (46) and the outer wall (98) each have a flat construction, or, in the cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipes (14, 16), an essentially straight construction, and are oriented essentially perpendicular to one another, it being provided in particular that the rear wall (46) is oriented essentially parallel to (coolant) pipes (120) that produce a flow connection between two collector pipes (14, 16) of the first heat exchanger (10).

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16. Heat exchanger unit according to one of the preceding claims, characterized in that the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) has adjacent wall segments that are essentially flat or straight and that enclose with one another an angle between 95° and 175° , preferably in the range from 100° to 170° , regarded in cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipe (14, 16) of the first heat exchanger (10).

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17. Heat exchanger unit according to Claim 16, characterized in that the front wall (96) has at least two such adjacent flat or straight wall segments that enclose with one another an angle between 95° and 175° , preferably in the range from 100° to 170° , regarded in the cross-section perpendicular to the longitudinal axis of the collector pipe (14, 16) of the first heat exchanger (10).

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18. Heat exchanger unit according to one of the preceding claims, characterized in that the collector pipes and the connection in terms of flow (120, 122) of the collector pipes, and/or the entire heat exchanger unit (1), are made of aluminum.

AMENDED CLAIMS

[submitted to the International Office on 18 October 2004; original Claims 1-18 replaced by amended Claims 1-39 (19 pages)]

5 1. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the
10 first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) [sic] being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering
15 wall (50, 54) of a collector pipe of the first heat exchanger (12) having a non-circular shape, regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16),

the second heat exchanger (12) being a condenser, in particular an air-conditioning
20 condenser, and

a collector 90 being situated on a collector pipe (20) of the second heat exchanger (12),
and

25 the cross-section or cross-sections (56, 60) of the covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) being essentially oval or (annularly) elliptical, or essentially circular in shape, regarded perpendicular to the longitudinal axis (36, 38), of the relevant collector pipe (18, 20);

30 the front wall (96) of the peripheral wall (50, 54) of at least one collector pipe (14, 16) of the first heat exchanger (10), which is the wall facing an adjacent collector pipe (18, 20)

of another heat exchanger (12), being continuously convex in the cross-section (48, 52) regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

2. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a
 5 second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe
 10 (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) being non-circular in shape,
 15 regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16),

the second heat exchanger (12) being a condenser, in particular an air-conditioning condenser, and

20 a collector 90 being situated on a collector pipe (20) of the second heat exchanger (12), and

the cross-section or cross-sections (56, 60) of the covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) being essentially oval or
 25 (annularly) elliptical, or essentially circular in shape, regarded perpendicular to the longitudinal axis (36, 38) of the relevant collector pipe (18, 20);

the front wall (96) of the peripheral wall (50, 54) of at least one collector pipe (18, 20) of the first heat exchanger (10), which is the wall facing an adjacent collector pipe (18, 20)
 30 of another heat exchanger (12), being continuously concave in the cross-section (48, 52) regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

3. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) being non-circular in shape, regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16),

the second heat exchanger (12) being a condenser, in particular an air-conditioning condenser, and

a collector 90 being situated on a collector pipe (20) of the second heat exchanger (12), and

the cross-section or cross-sections (56, 60) of the covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) being essentially oval or (annularly) elliptical, or essentially circular in shape, regarded perpendicular to the longitudinal axis (36, 38) of the relevant collector pipe (18, 20);

the front wall (96) of the peripheral wall (50, 54) of at least one collector pipe (14, 16) of the first heat exchanger (10), which is the wall facing an adjacent collector pipe (18, 20) of another heat exchanger (12), having a convex segment and a concave segment in the cross-section (48, 52) regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

4. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) being non-circular in shape, regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16),
- the second heat exchanger (12) being a condenser, in particular an air-conditioning condenser, and
- a collector 90 being situated on a collector pipe (20) of the second heat exchanger (12), and
- the cross-section or cross-sections (56, 60) of the covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) being essentially oval or (annularly) elliptical, or essentially circular in shape, regarded perpendicular to the longitudinal axis (36, 38) of the relevant collector pipe (18, 20);
- a heat exchanger block (22), having a plurality of pipes (120 or 122) oriented in parallel, being provided between the collector pipes (14, 16 or 18, 20) of the respective heat exchanger (10, 12);
- the front wall (96) of the peripheral wall (50, 54) of at least one collector pipe (14, 16) of the first heat exchanger (10), which is the wall facing an adjacent collector pipe (18, 20) of another heat exchanger (12), having a flat or straight construction, regarded in the

cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16), and running at an incline to the pipes (120) of this first heat exchanger (10).

5 Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe
10 (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (10) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) being non-circular in shape,
15 regarded perpendicular to the longitudinal axis (32, 34), of this collector pipe (14, 16),

the second heat exchanger (12) being a condenser, in particular an air-conditioning condenser, and

20 a collector 90 being situated on a collector pipe (20) of the second heat exchanger (12), and

the cross-section or cross-sections (56, 60) of the covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) being essentially oval or
25 (annularly) elliptical, or essentially circular in shape, regarded perpendicular to the longitudinal axis (36, 38), of the relevant collector pipe (18, 20);

a heat exchanger block (22), having a plurality of pipes (120, 122) oriented in parallel, being provided between the collector pipes (14, 16, 18, 20) of the respective heat
30 exchanger (10, 12);

the front wall (96) of the peripheral wall (50, 54) of at least one collector pipe (14, 16) of the first heat exchanger (10), which is the wall facing an adjacent collector pipe (18, 20) of another heat exchanger (12), having segments (200, 202) that are straight or flat in shape, regarded in the cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16), and which are situated at an angle to, or obliquely to, the longitudinal axis of a pipe (120) of the first heat exchanger (10), enclosing with one another an angle in the range between 95° and 175°.

6. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (12) being connected to one another in terms of flow, and the cross-section or cross-sections (48, 52) of this [sic] covering wall (50, 54) of at least one collector pipe (14, 16) of the first heat exchanger (10) being essentially oval or (annularly) elliptical in shape, regarded perpendicular to the longitudinal axis (32, 34) of the relevant collector pipe (14, 16), the second heat exchanger (12) being a condenser, in particular an air-conditioning condenser.

7. Heat exchanger unit according to Claim 6, characterized in that the cross-section or cross-sections (56, 60) of this covering wall (58, 62) of at least one collector pipe (18, 20) of the second heat exchanger (12) are essentially oval or (annularly) elliptical in shape, regarded perpendicular to the longitudinal axis (32, 34, 36, 38), of the relevant collector pipe (18, 20).

8. Heat exchanger unit according to one of the preceding claims, characterized in that a cross-section or cross-sections (48, 52, 56, 60) of the covering wall (50, 54, 58, 62) of at

least one collector pipe (14, 16, 18, 20) of the first (10) and/or second (12) heat exchanger, regarded perpendicular to the longitudinal axis (32, 34, 36, 38) of the relevant collector pipe (14, 16, 18, 20), are constructed in such a way that overlapping wall segments (128, 132, or 130, 134, or 72, 74, or 76, 78, or 218, 220, or 222, 224, or 240, 242, or 250, 252, or 260, 262) are present.

9. Heat exchanger unit according to one of the preceding claims, characterized in that the heat exchanger unit has at least one heat exchanger (10) that is a radiator and that has two collector pipes (14, 16) at a distance from one another, these two collector pipes (14, 16) of this heat exchanger (10) being connected to one another in terms of flow, and in addition the covering wall (48, 52) of one or both of these collector pipes (14, 16) being non-circular in shape, regarded in the cross-section or cross-sections (48, 52) perpendicular to the longitudinal axis (32, 34) of the relevant pipe, and the wall (24, 26), facing the other collector pipe (16, 14) of this heat exchanger (10), of the covering wall (50, 54) of this collector pipe (14, 16) being a base wall (24, 26), and the base wall (24, 26) of one or both of these collector pipes (14, 16) having a segment that is curved in the named cross-section or cross-sections, or is essentially completely curved.

10. Heat exchanger unit according to one of the preceding claims, characterized in that the first heat exchanger (10) is a radiator, or has at least one radiator, and the second heat exchanger (12) is an air-conditioner condenser.

11. Heat exchanger unit according to one of the preceding claims, characterized in that at least one collector pipe (14, 16) of the first heat exchanger (10) is limited by a wall (the base wall (24, 26)) that is situated on the side facing the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the outer wall (98)) that is situated on the side facing away from the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the front wall (96)) that faces the adjacent collector pipe (18, 20) of the second heat exchanger (12), as well as by a wall (the rear wall (46)) that faces away from the adjacent collector pipe (18, 20) of the second heat exchanger (12), it being provided in particular that the direction of longitudinal extension of these walls (24, 46, 96, 98)

corresponds essentially to the direction of longitudinal extension of this collector pipe (14, 16) of the first heat exchanger (10).

12. Heat exchanger unit according to one of the preceding claims, characterized in that at least one wall segment (150, 170, 172, 180, 190) or a wall (46, 96, 98) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is concavely curved, regarded in a cross-section or in all cross-sections (48, 52) that is/are situated perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

13. Heat exchanger unit according to one of the preceding claims, characterized in that at least one wall (24, 46, 96, 98) or a wall segment (152, 154, 172, 182, 187, 192) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is convexly curved, regarded in the cross-section or cross-sections (48, 52) perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

14. Heat exchanger unit according to Claim 13, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) and/or this convexly curved wall (24, 46, 96, 98) is curved in such a way that various radii of curvature (R) are present in this wall segment (152, 154, 172, 182, 187, 192) or in this wall (24, 46, 96, 98).

15. Heat exchanger unit according to Claim 13 or Claim 14, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98) or of this convexly curved wall segment (152, 154, 172, 182, 187, 192) is less than $(0.5 \cdot x \cdot \pi)$ times the radius of curvature (R) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater than zero and less than 0.8.

16. Heat exchanger unit according to one of Claims 13 to 15, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that along the (segment) length (s_{total}) of this

convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154, 172, 182, 187, 192), various radii of curvature (R) are provided, the (segment) length (s_{total}) being less than $(0.5 \cdot x \cdot \pi)$ times the minimum radius of curvature (R_{minimum}) of these radii of curvature (R), and x being greater than zero and less than 0.8.

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17. Heat exchanger unit according to one of Claims 13 to 16, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192), or this convexly curved wall (24, 46, 96, 98), is curved in such a way that along the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154, 172, 182, 187, 192), various radii of curvature are provided, the (segment) length (s_{total}) being less than $(0.5 \cdot x \cdot \pi)$ times the mean radius of curvature (R_{mean}) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater than zero and less than 0.8, and the mean radius of curvature (R_{mean}) corresponding to the quotient of an integral and the (segment) length (s_{total}), this integral being the integral of $(s \cdot R(s))ds$ within the limits $s=0$ and $s=s_{\text{total}}$, s being the path running along the curved wall segment (152, 154, 172, 182, 187, 192), or along the convexly curved wall (24, 46, 96, 98), and $R(s)$ being the radius of curvature at a particular position along this path.

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18. Heat exchanger unit according to one of Claims 13 to 17, characterized in that the front wall (96) and/or the base wall (98) has such a curved wall segment, or is such a curved wall segment.

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19. Heat exchanger unit according to Claim 18, characterized in that the rear wall (46) and the outer wall (98) each have a flat construction, or, in the cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipe (14, 16), an essentially straight construction, and are oriented essentially perpendicular to one another, it being provided in particular that the rear wall (46) is oriented essentially parallel to (coolant) pipes (120) that produce a flow connection between two collector pipes (14, 16) of the first heat exchanger (10).

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20. Heat exchanger unit according to one of the preceding claims, characterized in that the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) has adjacent wall segments that are essentially flat or straight and that enclose with one another an angle between 95° and 175° , preferably in the range from 100° to 170° ,
 5 regarded in the cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipe (14, 16) of the first heat exchanger (10).

21. Heat exchanger unit according to one of the preceding claims, characterized in that the collector pipes and the connection in terms of flow (120, 122) of the collector pipes,
 10 and/or the entire heat exchanger unit (1), are made of aluminum.

22. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe
 15 (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two
 20 collector pipes (18, 20) of the second heat exchanger (10) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52) of the covering wall (50, 54) of a collector pipe of the first heat exchanger (12) being non-circular in shape, regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

25 23. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the
 30 first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of

the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (12) being connected to one another in terms of flow, and the cross-section or cross-sections (48, 52, 56, 60) of this [sic] covering wall (50, 54, 58, 62) of at least one collector pipe (14, 16) of the first heat exchanger (10) and/or second heat exchanger (12) being essentially oval or (annularly) elliptical in shape, regarded perpendicular to the longitudinal axis (32, 34, 36, 38), of the relevant collector pipe (14, 16, 18, 20).

24. Heat exchanger unit for motor vehicles, having a first heat exchanger (10) as well as a second heat exchanger (12), each of these heat exchangers (10, 12) having two collector pipes (14, 16 or 18, 20) situated at a distance from one another, and each collector pipe (14) of the first heat exchanger (10) being situated essentially adjacent to a collector pipe (18) of the second heat exchanger (12), and in addition the other collector pipe (16) of the first heat exchanger (10) being situated essentially adjacent to the other collector pipe (20) of the second heat exchanger (12), and in addition the two collector pipes (14, 16) of the first heat exchanger (10) being connected to one another in terms of flow, and the two collector pipes (18, 20) of the second heat exchanger (12) being connected to one another in terms of flow, and a cross-section or cross-sections (48, 52, 56, 60) of the covering wall (50, 54, 58, 62) of at least one collector pipe (14, 16, 18, 20) of the first heat exchanger (10) or the second heat exchanger (12), regarded perpendicular to the longitudinal axis (32, 34, 36, 38), of the relevant collector pipe (14, 16, 18, 20), being shaped in such a way that overlapping wall segments (128, 132, or 130, 134, or 72, 74, or 76, 78, or 218, 220, or 222, 224, or 240, 242, or 250, 252, or 260, 262) are present.

25. Heat exchanger unit for motor vehicles, having at least one heat exchanger (10), this heat exchanger (10), which is in particular a radiator, having two collector pipes (14, 16) situated at a distance from one another, and these two collector pipes (14, 16) of this heat exchanger (10) being connected to one another in terms of flow, and in addition the covering wall (48, 52) of one or both of these collector pipes (14, 16) having a non-circular shape, in the cross-section or cross-sections (48, 52) of the relevant collector pipe regarded perpendicular to the longitudinal axis (32, 34) of this collector pipe, and the wall

(24, 26), facing the other collector pipe (16, 14) of this heat exchanger (10), of the covering wall (50, 54) of this collector pipe (14, 16) being a base wall (24, 26), and the base wall (24, 26) of one or both of these collector pipes (14, 16) having a segment that is curved in the named cross-section or cross-sections, or is essentially completely curved.

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26. Heat exchanger unit according to a plurality of Claims 22 to 25.

27. Heat exchanger unit according to one of Claims 22 to 26, characterized in that the first heat exchanger (10) is a radiator or has at least one radiator, and/or the second heat
10 exchanger (12) is an air-conditioning condenser or has at least one air-conditioning condenser.

28. Heat exchanger unit according to one of Claims 22 to 27, characterized in that at least one collector pipe (14, 16) of the first heat exchanger (10) is limited by a wall (the base
15 wall (24, 26)) that is situated on the side facing the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the outer wall (98)) that is situated on the side facing away from the other collector pipe (16, 14) of this first heat exchanger (10), and by a wall (the front wall (96)) that faces the adjacent collector pipe (18, 20) of the second heat exchanger (12), as well as by a wall (the rear wall (46)) that faces away from the
20 adjacent collector pipe (18, 20) of the second heat exchanger (12), it being provided in particular that the direction of longitudinal extension of these walls (24, 46, 96, 98) corresponds essentially to the direction of longitudinal extension of this collector pipe (14, 16) of the first heat exchanger (10).

25 29. Heat exchanger unit according to one of Claims 22 to 28, characterized in that at least one wall segment (150, 170, 172, 180, 190) or a wall (46, 96, 98) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is concavely curved, regarded in one or in all cross-sections (48, 52) that is/are situated perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

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30. Heat exchanger unit according to one of Claims 22 to 29, characterized in that at least one wall (24, 46, 96, 98) or a wall segment (152, 154, 172, 182, 187, 192) of the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) is convexly curved, regarded in the cross-section or cross-sections (48, 52) situated perpendicular to the longitudinal axis (32, 34) of this collector pipe (14, 16).

31. Heat exchanger unit according to Claim 30, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) and/or this convexly curved wall (24, 46, 96, 98) is curved in such a way that various radii of curvature (R) are present in this wall segment (152, 154, 172, 182, 187, 192) or in this wall (24, 46, 96, 98).

32. Heat exchanger unit according to Claim 30 or Claim 31, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98) or of this convexly curved wall segment (152, 154, 172, 182, 187, 192) is less than $(0.5 \cdot x \cdot \pi)$ times the radius of curvature (R) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater than zero and less than 0.8.

33. Heat exchanger unit according to one of Claims 30 to 32, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192) or this convexly curved wall (24, 46, 96, 98) is curved in such a way that along the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154, 172, 182, 187, 192), various radii of curvature (R) are present, the segment length (s_{total}) being less than $(0.5 \cdot x \cdot \pi)$ times the minimum radius of curvature ($R_{minimum}$) of these radii of curvature (R), and x being greater than zero and less than 0.8.

34. Heat exchanger unit according to one of Claims 30 to 33, characterized in that this convexly curved wall segment (152, 154, 172, 182, 187, 192), or this convexly curved wall (24, 46, 96, 98), is curved in such a way that along the (segment) length (s_{total}) of this convexly curved wall (24, 46, 96, 98), or of this convexly curved wall segment (152, 154,

172, 182, 187, 192), various radii of curvature are present, the (segment) length (s_{total}) being less than $(0.5 \cdot x \cdot \pi)$ times the mean radius of curvature (R_{mean}) of this wall segment (152, 154, 172, 182, 187, 192) or of this wall (24, 46, 96, 98), x being greater than zero and less than 0.8, and the mean radius of curvature (R_{mean}) corresponding to the quotient
 5 of an integral and the (segment) length (s_{total}), this integral being the integral of $(s \cdot R(s))ds$ within the limits $s=0$ and $s=s_{\text{total}}$, s being the path running along the curved wall segment (152, 154, 172, 182, 187, 192), or along the convexly curved wall (24, 46, 96, 98), and $R(s)$ being the radius of curvature at a particular position along this path.

10 35. Heat exchanger unit according to one of Claims 30 to 34, characterized in that the front wall (96) and/or the base wall (98) has such a curved wall segment, or is such a curved wall segment.

36. Heat exchanger unit according to Claim 35, characterized in that the rear wall (46)
 15 and the outer wall (98) each have a flat construction, or, in the cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipe (14, 16), an essentially straight construction, and are oriented essentially perpendicular to one another, it being provided in particular that the rear wall (46) is oriented essentially parallel to (coolant) pipes (120) that produce a flow connection between two collector pipes (14, 16) of the
 20 first heat exchanger (10).

37. Heat exchanger unit according to one of Claims 22 to 36, characterized in that the covering wall (50, 54) of a collector pipe (14, 16) of the first heat exchanger (10) has adjacent wall segments that are essentially flat or straight and that enclose with one
 25 another an angle between 95° and 175° , preferably in the range from 100° to 170° , regarded in cross-section (48, 52) perpendicular to the longitudinal axis (32, 34) of the collector pipe (14, 16) of the first heat exchanger (10).

38. Heat exchanger unit according to Claim 37, characterized in that the front wall (96)
 30 has at least two such adjacent flat or straight wall segments that enclose with one another an angle between 95° and 175° , preferably in the range from 100° to 170° , regarded in

the cross-section perpendicular to the longitudinal axis of the collector pipe (14, 16) of the first heat exchanger (10).

39. Heat exchanger unit according to one of Claims 22 to 38, characterized in that the
5 collector pipes and the connection in terms of flow (120, 122) of the collector pipes,
and/or the entire heat exchanger unit (1), are made of aluminum.